I claim:

1. A composition for sealing a vascular puncture site comprising

a first component including an electrophilic polymer material having a functionality of at least three,

a second component including a nucleophilic material that, when mixed with the first component within a reaction pH range of between 7 to 9, cross-links with the first component to form a non-liquid, three-dimensional barrier, and

a buffer material mixed with the second component and having a pH within the reaction pH range.

2. A composition according to claim 1

wherein the first component includes poly(ethylene glycol), poly(ethylene oxide), poly(vinyl alcohol), poly(vinylpyrrolidinone), poly(ethyloxazoline), and poly(ethylene glycol)-co-poly(propylene glycol) block copolymers.

3. A composition according to claim 1

wherein the first component comprises poly(ethylene glycol) having a molecular weight between 9000 and 12,000.

4. A composition according to claim 4

wherein the molecular weight is 10,500 ± 1500.

5. A composition according to claim 1

wherein the first component includes a degradation control region selected to achieve a desired degradation period, during which the non-liquid, three-dimensional barrier degrades over time back to a liquid form.

6. A material according to claim 1

wherein the first component comprises a compound of the formula PEG-(DCR-CG)$_n$, where PEG is poly(ethylene glycol), DCR is a degradation control region, CG is a cross-linking group, and n is equal to or greater than three.

7. A composition according to claim 6 wherein the second component and buffer material, when mixed, have a pH of between 8.3 and 8.5 prior to mixing with the first component.

8. A material according to claim 6 wherein the cross-linking group is selected to react with at least one thiol.

9. A material according to claim 8 wherein the cross-linking group is selected from a group consisting essentially of vinyl sulfone, N-ethyl maleimide, iodoacetamide, and orthopyridyl disulfide.

10. A material according to claim 6 wherein the cross-linking group is selected to react with at least one amine.

11. A material according to claim 10 wherein the cross-linking group is selected from a group consisting essentially of aldehydes.

12. A material according to claim 6 wherein the cross-linking group is selected from a group consisting essentially of active esters, epoxides, oxycarbonylimidazole, nitrophenyl carbonates, tresylate, mesylate, tosylate, and isocyanate.

13. A material according to claim 6 wherein the cross-linking group includes an ester of N-hydroxysuccinimide.

14. A composition according to claim 1 wherein the first component comprises a multi-armed polymer structure.

15. A composition according to claim 1 wherein the second component comprises a hydrophilic protein.

16. A composition according to claim 15 wherein the hydrophilic protein is selected from a group consisting essentially of serum, serum fractions, and solutions of albumin, gelatin, antibodies, fibrinogen,

and serum proteins.

17. A composition according to claim 15 wherein the hydrophilic protein comprises at least one water soluble derivative of a hydrophobic protein.

18. A composition according to claim 17 wherein the water soluble derivative of a hydrophobic protein is selected from a group consisting essentially of comprising solutions of collagen, elastin, chitosan, and hyaluronic acid.

19. A composition according to claim 17 wherein the hydrophilic protein comprises at least one hybrid protein.

20. A composition according to claim 15 wherein the hydrophilic protein comprises at least one synthetic amino acid sequence.

21. A composition according to claim 15 wherein the hydrophilic protein comprises recombinant or natural human serum albumin.

22. A material according to claim 15 wherein the hydrophilic protein comprises human serum albumin at a concentration of about 25% or less.

23. A composition according to claim 1 wherein the buffer material includes tris-hydroxymethylaminomethane.

24. A composition according to claim 23 wherein the buffer material includes sodium carbonate anhydrous.

25. A composition for sealing a vascular puncture site comprising

a first component including poly(ethylene glycol) having a molecular weight between 9000 and 12,000 and having a functionality of at least three,

a second component including human albumin at a concentration not greater than 25% that, when mixed with the first component within a reaction pH range of between 7 to

9, cross-links with the first component to form a non-liquid, three-dimensional barrier, and

a buffer material including tris-hydroxymethylaminomethane mixed with the second component and having a pH within the reaction pH range.

26. A composition according to claim 25 wherein the composition comprises a buffered albumin formulation comprising about .217 to 0.290 grams of tris-hydroxymethylaminomethane per 20 ml of human albumin, mixed with a poly(ethylene glycol) formulation comprising poly(ethylene glycol) suspended in water, the mixture of the buffer albumin formulation and the poly(ethylene glycol) formulation having a weight to weight ratio between the poly(ethylene glycol) and the human albumin that lays within a range of about 1 to about 0.6 to 1.8.

27. A composition according to claim 26 wherein the weight to weight ratio is about 1 to 1.

28. A composition according to claim 25 wherein the buffer material includes sodium carbonate anhydrous.

29. A composition according to claim 25 wherein the composition comprises a buffered albumin formulation comprising about .217 to 0.290 grams of tris-hydroxymethylaminomethane and about 0.075 to 0.138 grams of sodium carbonate anhydrous per 20 ml of human albumin, mixed with a poly(ethylene glycol) formulation comprising poly(ethylene glycol) suspended in water, the mixture of the buffer albumin formulation and the poly(ethylene glycol) formulation having a weight to weight ratio between the poly(ethylene glycol) and the human albumin that lays within a range of about 1 to about 0.6 to 1.8.

30. A composition according to claim 29 wherein the weight to weight ratio is about 1 to

1.

31. A composition according to claim 25 wherein the first component has a molecular weight of 10,500 ± 1500.

32. A composition according to claim 25 wherein the second component, when mixed with the buffer material, has a pH of between 8.3 and 8.5 prior to mixing with the first component.

33. A system for forming a biocompatible material comprising

a first component including electrophilic polymer material having a functionality of at least three,

a second component including a nucleophilic material that, when mixed with the first component within a reaction pH range of between 7 to 9, cross-links with the first component to form a non-liquid, three-dimensional barrier,

a buffer material mixed with the second component and having a pH within the reaction pH range, and

instructions for forming a mixture of the first component, second component, and buffer material and for applying the mixture to seal a vascular puncture site.

34. A system according to claim 33 wherein the first component comprises poly(ethylene glycol) having a molecular weight between 9000 and 12,000.

35. A system according to claim 34 wherein the poly(ethylene glycol) has a molecular weight of 10,500 ± 1500.

36. A system according to claim 34 wherein the second component comprises human serum albumin at a concentration of about 25% or less.

37. A system according to claim 36 wherein the buffer material includes tris-hydroxymethylaminomethane.

38. A system according to claim 37

wherein the buffer material includes sodium carbonate anhydrous.

39. A system according to claim 38

wherein the second component, when mixed with the buffer material, has a pH of between 8.3 and 8.5 prior to mixing with the first component.

40. A method for sealing a vascular puncture site comprising the steps of

mixing a first component, a second component, and a buffer material, the first component including an electrophilic polymer material having a functionality of at least three, the second component including a nucleophilic material that, when mixed with the first component within a reaction pH range of between 7 to 9, cross-links with the first component to form a non-liquid, three-dimensional barrier, and the buffer material having a pH within the reaction pH range, and

applying the mixture to seal a vascular puncture site.

41. A method according to claim 40

wherein the first component comprises poly(ethylene glycol) having a molecular weight between 9000 and 12,000.

42. A method according to claim 41

wherein the poly(ethylene glycol) has a molecular weight of 10,500 ± 1500.

43. A method according to claim 41

wherein the second component comprises human serum albumin at a concentration of about 25% or less.

44. A method according to claim 43

wherein the buffer material includes tris-hydroxymethylaminomethane.

45. A method according to claim 44

wherein the buffer material includes sodium

carbonate anhydrous.

46. A method according to claim 45

wherein the second component, when mixed with the buffer material, has a pH of between 8.3 and 8.5 prior to mixing with the first component.